Equipment Protection

A fuse must be provided in each ungrounded conductor (no protection is required for a capacitor connected on the load-side of a motor running overcurrent device). The fuse rating must be as low as practical [460.8(B)]. Generally, size dual-element, current-limiting fuses at 150% to 175% of the capacitor rated current and size non-time-delay, fast-acting, current-limiting fuses at 250% to 300% of the capacitor rated current. Conductor ampacity must be at least 135% of the capacitor rated current [460.8(A)]. The ampacity of conductors for a capacitor connected to a motor circuit must be \(\frac{3}{4}\) the ampacity of the motor circuit conductors [460.8(A)].

Arc Welders must be protected by a fuse rated at not more than 200% of the rated primary current. The fuse protecting the supply conductor can serve as the welder protection, if the fuse is rated at not more than 200% of \(I_{\text{t, max}}\) or the welder rated primary current [630.12(A)]. Conductors supplying one or more welders must be protected by a fuse rated at not more than 200% of the conductor rating [630.12(B)].

Resistance Welders must be protected by a fuse rated at not more than 300% of the rated primary current of the welder. The fuse protecting the supply conductor can serve as the welder protection if the fuse is rated at not more than 200% of the welder rated primary current [630.32(A)]. Conductors supplying one or more welders must be protected by a fuse rated at not more than 300% of the conductor rating [630.32(B)].

For arc welder and resistance welder protection, Fusetron and Low-Peak dual-element fuses can be sized much closer than the above limits of 200% and 300%, respectively. Generally, the amp rating of these dual-element fuses can be sized at 100% of the conductor ampacity as determined according to the respective duty cycle multipliers found in 630.11(A), and 630.31(A)(2). As an example, for a resistance welder rated on a 50% duty cycle, Fusetron or Low-Peak dual-element fuses can be sized at 71% of the welder rated primary current.

Hazardous (Classified) Locations

The characteristics of various atmospheric mixtures of hazardous gases, vapors and dusts depend on the specific hazardous material involved. It is necessary therefore that equipment be approved not only for the class of location but also for the specific gas, vapor or dust that will be present (500.5).

Class I Division 1

Fuses located in Class I Division 1 locations are required to be provided with enclosures that are identified as a complete assembly for use in Class I locations [501.115(A)].

Class I Division 2 Fuses In General Purpose Enclosures

Certain fuses are permitted to be used in general purpose enclosures. 501.115(B)(3) addresses the use of current-limiting fuses in Class I Division 2 locations. Plug and cartridge fuses used for the protection of motors, appliances, and lamps are permitted provided they are placed in enclosures rated for the location. Fuses are permitted in general-purpose enclosures if they meet one of the following criteria:

- a. They are the type which the element is immersed in oil or other approved liquid
- b. The element is hermetically sealed against gases and vapors
- c. They are non-indicating, filled, and current-limiting type

Cooper Bussmann offers many fuses that meet the criteria for non-indicating, filled, current-limiting type (check Data Sheet 8003 for any updates):

- **Class CC**: LP-CC \(\frac{3}{4}\) - 30A, KTK-R \(\frac{3}{4}\) - 30 A, FNQ-R \(\frac{3}{4}\) - 30A
- **Class T**: JN 1 - 1200A, JJS 1 - 800A
- **Class J**: JKS 1 - 600A, LPJ_SP 1 - 600A
- **Class G**: SC \(\frac{3}{4}\) - 60A

- **Class RK1**: KTN-R 1 - 600A, KTS-R 1 - 600A, LPN-RK_SP* 3\(\frac{3}{4}\) -6\(\frac{3}{4}\) and 65 - 600A, LPS-RK SP* 65 - 600A
- **Class RK5**: FRN-R 3\(\frac{3}{4}\) - 7\(\frac{3}{4}\) and 450 - 600A, FRS-R** 65 - 600A
- **Class L**: KRP-C_SP 601 - 6000A, KTS 601 - 6000A, KLU 601 - 4000A

*Fuses from July 1996 or date code C28 to present only.

**Fuses from October 1997 or date code D40 to present only

Class I, Division II — Listed cartridge fuses shall be permitted in luminaries (lighting fixtures) [501.115(B)(4)].

Class II, Division I — Fuses must be provided with enclosures approved for Class II locations [502.115(A)(1)].

Class II, Division 2 — Fuses must be provided with dust tight enclosures [502.115(B) and 502.135(B)(3)].

Class III, Fuses must be provided with dust tight enclosures (503.115).

Mobile Homes

The branch circuit equipment may be combined with the disconnecting means as a single assembly. Such a combination may be designated as a distribution panel. Plug fuses must be Type S (560.11).

Branch circuit overcurrent devices must be rated [550.11(B)]:

1. Not more than the circuit conductors.
2. Not more than 150% of the rating of a single appliance rated 13.3A or more supplied by an individual branch circuit.
3. Not more than the fuse size marked on the air conditioner or other motor-operated appliance.

Ballasts

Each light fixture ballast should be individually protected by fuses. Fusing each fixture provides protection and isolation of a faulted ballast. When a ballast does fail, only the fuse for that fixture opens, and the remaining fixtures continue in normal operation. Without this individual ballast protection, a faulted ballast could cause the branch circuit protective device to open, thereby blacking out all fixtures. Additionally, special integrally protected ballasts, known as Class P Ballasts, are UL Listed under a 200A short circuit test condition. This test is conducted utilizing a fuse as the branch protection. The starting current and continuous current characteristics for lighting ballast can vary considerably for various manufacturers. For proper fuse amp rating, observe ballast manufacturer’s recommendation.

There is a wide variety of supplementary and branch circuit fuses available for protection of light fixture ballasts including fluorescent lighting, mercury vapor lighting, and sodium lighting, indoor and outdoor.

See additional information under Component Protection—Ballasts.